

GARRYALES

I follow the analysis and recommendations of Kårehed in greatly reducing the Icacinaceae in scope and placing

it here in the Garryales. However, note that STEVENS *loc. cit.*, among others, while accepting the new family circumscriptions sits the newly narrowed Icacinaceae in an unresolved location outside the order, which limits the Garryales to two families, three genera, 18 species.

¹Kårehed, J. 2001. American Journal of Botany 88: 2259–2274.

#

ASTERIDS (LAMIIDS): GARRYALES

ICACINACEAE

NAME: From the genus *Icacina*, of tropical Africa.

OVERVIEW: Formerly a medium-sized and obviously polyphyletic family, the Icacinaceae is now a smaller family of 34 genera, especially of tropical Africa. Of the genera that were formerly in Icacinaceae, some are now in the new family Stemonuraceae and placed as relatives of the holly family, Aquifoliales. Still placed here with *Icacina* are three genera of trees in tropical Asia: *Apodytes*, *Nothapodytes* and *Platea*. It can be fairly said that these are among the most undistinguished of all species in our forests. It is, in fact, the lack of hardly any distinguishing vegetative feature that should send you in the direction of the Icacinaceae: no exudate, no odor, no swelling to the stalk (although look for a groove on the upper side), no trace of a stipule, ordinary pinnate venation, the margin without teeth. The flowers are likewise un-

remarkable: with parts in fives, a small calyx sits below the five white petals that alternate with the stamens. The tip of the petal is often inflexed. The ovary gives the only ready hint of the family identity. It is three-loculate, but only one locule fully develops and it bears two pendulous ovules, one of which matures. The resulting fruit is a drupe with a broad flat stigma and a flat stone bearing sculptured furrows.

Among the four genera of trees, *Platea* is quickly distinguished by the silver scaly lower leaf surface and the unisexual flowers. Of the other three, *Apodytes* has elliptic leaves, more or less in a plane, and the fruit bears an eccentric style and a fleshy appendage to one side. *Nothapodytes* has leaves upturned in spiral clusters, the petals are hairy inside. *Pittosporopsis* is found only in the very far north of Mainland SE Asia, the leaves are elliptic, arranged in a plane, the margin wavy and the inside of the petals smooth.

We might mention *Miquelia*, a genus of maybe eight or more species, not well known, but fairly common lianas throughout tropical Asia; with long sinuous leaf



Nothapodytes nimmoniana (= *N. foetida*); on the left is a drawing of a flowering twig with details of flower and fruit; on the right, a photograph from Huai Kha Khaeng, Thailand, showing the trunk, bark, a cut of the wood, the inflorescence here, small and immature; note absence of a stipule and the forking of the nerves in the upper third of the blade. (Drawing adapted from WIGHT *loc. cit.*)



stalks, otherwise undistinguished except in the long inflorescence stalks that subtend dense heads of flowers and fruits. Reports that these climbers are occasionally free-standing should be confirmed.

NOTHAPODYTES. [Greek, differs from *Apodytes*.] A small genus of five species of the dry seasonal parts of Asia. The best known species is the widespread *Nothapodytes nimmoniana* which is now considered the correct name for *N. foetida* (and *Mappia foetida*). It is found from Sri Lanka and India east to China and Mainland SE Asia, in N Sumatra, not otherwise in the Sundaic Region, but east from mainland China to Taiwan and from there perhaps south to Isabela Province in Luzon, Philippines. The tree does indeed exude a fetid odor. It has become relatively famous in recent decades as the best natural source of camptothecin, an alkaloid and one of the most promising anti-cancer drugs. The other species are of local occurrence in Mainland SE Asia and also *N. montana* in Sumatra and Java.

APODYTES. [Greek, to strip, the calyx is minute, the petals fall away.] Probably a suite of a dozen or so closely related species, many with published names, but all very similar and currently synonymized under a single species, *Apodytes dimidiata*, based on an African type. If crudely lumped in this fashion, the distribution is from Africa (where it is abundant and well known) to Sri Lanka, S India, to the lowlands and mountains of Mainland SE Asia, then with greater rarity from 1000 m in central Malaya, as far east as 1500 m on Kinabalu, from Maluku and northward in the Philippines where it is known from a single collection in Mindanao (as the synonym *Mappia philippinensis*). A variant form is preferably called *A. brachystylis* in Queensland, Australia.



Apodytes dimidiata, flowering twig and floral details, adapted from WIGHT *loc. cit.*

The tree blooms episodically and then is conspicuously clothed in clusters of bright white flowers and later in small red fruit.

Apodytes



Apodytes dimidiata, cultivated in Saigon Botanic Gardens; short unswollen leaf stalk, without trace of a stipule, the leaf base sometimes unequal.

Platea



Platea excelsa. Lower leaf surface; 1, fresh leaf, Kanlaon, Philippines (Leonardo L. Co.); 2, dry voucher specimen from Pasoh Forest, Malaya.

PLATEA. [From Latin for a broad street, uncertain application.] Maybe five species distinguished from other trees in the Icacinaceae by the unisexual flowers, dioecious condition, and silvery star-like scales on the lower leaf surface and twigs. These are easily overlooked trees and almost nothing is known of their basic biology. They show up in low density in most parts of tropical Asia, appear to be fast growing trees of large gaps and forest margins. The trunk is of poor form, the twig and leaves with an unpleasant odor.

PITTOSPOROPSIS. [Greek, like *Pittosporum*.] Do not confuse the name with *Pittosporum*. The genus *Pittosporopsis* consists of a single species, *P. kerrii*, an uncommon tree in S China and Mainland SE Asia. It was not included in the cited molecular study and may not belong to this family. [Not illustrated, but see photographs in GARDNER *loc. cit.*]

#

GENTIANALES

In this volume, the Gentianales are treated as comprising six families, 1119 genera, and 16,6379 species, cosmopolitan in distribution, with most of the diversity in the tropics. The numbers follow STEVENS *loc. cit.*, except that I segregate the enigmatic *Pteleocarpa* as its own family rather than place it in the Gelsemiaceae. The order includes two of the large and important families of tropical trees, the Rubiaceae and Apocynaceae. The other families are of either smaller size or of lesser representation among our tree flora, but families that nonetheless include a few trees of significance.

In stature and habit, the order is most conspicuous among the smaller trees, the shrubs, lianas and herbs, although we find a few large trees among the Rubiaceae and Apocynaceae, including *Dyera* (Apocynaceae) which must rank among the largest of all Asian trees.

Most species in the order bear opposite leaves, although a spiral arrangement is found in Apocynaceae.

Also common in the order are glandular bodies, usually termed colleters, heterogeneous in form, and found variously on the leaves and flowers as well as the typical location in the axil of the leaves. The plant body is often rich in alkaloids, iridoids or both; from these chemicals many of species in the order have gained fame as plants of economic value, including coffee and *Strychnos*. The most obvious vegetative difference between the Apocynaceae and the Rubiaceae lies in the abundant and free flowing milky white latex of the former; exudates are for the most part unknown in the Rubiaceae and only scantily present in the other families.

The flower is commonly of radial symmetry with parts in fours and fives, a single whorl of stamens, and a corolla tube. Floral specializations are mostly associated with varied types of insect pollination.

The phylogeny offered below follows recent summations of molecular data^{1,2}, APG III and the review by STEVENS *loc. cit.* Also, see the discussion in STEVENS *loc. cit.* regarding the wide scattering of genera in the former Loganiaceae, the circumscription of which he considers the central issue in understanding the order.

¹Struwe, L., et al. 1994. *Cladistics* 10: 175–205.
²Backlund, M. et al. 2000. *American Journal of Botany* 87: 1029-1043.

Phylogeny of Gentianales

	Family	Diversity & Distribution	Trees of Tropical Asia
	Pteleocarpaceae	1/2, Sundaic Region.	1/2, Sundaic Region.
	Rubiaceae	660 / 11,150, global but overwhelmingly tropical.	72/1400, rich in shrubs with narrow local distribution.
	Gentianaceae	87/1655, worldwide, but especially herbs of the Temperate Zone.	1/10, <i>Fagraea</i> , shrubs, especially epiphytes, and trees
	Loganiaceae	13/420, pantropical, herbs, trees, epiphytic shrubs.	3/10 (?), uncertain species limits, especially <i>Geniostoma</i> .
	Gelsemiaceae	2 / 11,	0.
	Apocynaceae	415 / 4555 largely tropical and warm temperate.	14/50, varied in stature and habitat.



Solanum marginatum (= *S. coagulans*), a naturalized weed from the Mediterranean; drawing adapted from BLANCO *loc. cit.*

cultivated or as herbaceous weeds. Of the native species, few if any can genuinely be classified as trees. Some of the hardier species, such as the strongly spiny Thai species, *S. ferox*, can exceed two m or more in height. Possibly a new woody species is still possible in the unexplored hills of Thailand and Philippines.



Brugmansia hybrids are all of Neotropical origin, but commonly cultivated in tropical Asia; here in Baguio Cty, Philippines.

BRUGMANSIA. [Commemorates Dutch botanist S. Brugmans d. 1879.] A genus of maybe six species, all from tropical America, but widely cultivated for the enormous pendent flowers. The genus is an arborescent sister-taxon of *Datura*. They share strong hallucinogenic poisons and are usually called angel's trumpet or devil's trumpet.

#

AQUIFOLIALES

Following STEVENS *loc. cit.* this is a small order of five families, 21 genera, 536 species, characterized by simple alternate leaves usually without stipules, clusters of small flowers that bear one-two apical apotropous ovules per carpel, the fruit matures as a drupe with a few one-seeded stones.

the hollies in the mountains and and several trees of interest in the lowland equatorial parts of the Sundaic

Region. These include trees that are easily misidentified in the field. Even the fruit can look like santalalean families such as *Strombsia* and *Alangium*.

	Family	Diversity & Distribution	Trees of Tropical Asia
	Cardiopteridaceae	5/43, pantropical, woody .	2/9.
	Stemonuraceae	12/95, especially Tropical Asia.	5/50, with 4 more genera New Guinea to Pacific.
	Phyllonomaceae	1/4, Neotropics.	0.
	Helwingiaceae	1/3, Himalayas to Japan.	0.
	Aquifoliaceae	1/400, more or less global.	1/150, <i>Ilex</i> , mostly montane, a few in the lowlands.

CARDIOPTERIDACEAE

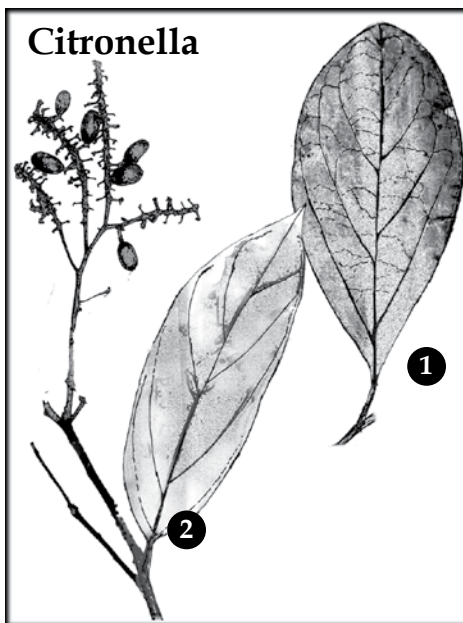
NAME: From the genus *Cardiopteris*, an old name and old family dating to Blume, long lost by submersion into a polyphyletic Icacinaeae, now resurrected to encompass a small portion that former assemblage, but an unfortunate type genus in that the twining habit and broadly palmate leaves of *Cardiopteris* are atypical of the other genera. In its new circumscription we might commonly call this the *Gonocaryum* family after the most abundant and widespread Asian genus.

OVERVIEW: Following recent molecular studies¹ this family includes seven genera and about 20 species with some representation in all of the tropical continents. Given its novel circumscription, it might be useful to list the currently accepted genera and their number of species. In Africa and Madagascar we find six species of *Leptaulus*. In tropical Asia we have two species of *Cardiopteris*, nine species of *Gonocaryum*, two or three species of *Pseudobotrys*, and a possibly polyphyletic *Citronella* with 21 species mostly east of our area from the Philippines and Australia to the Pacific and S America. In the Neotropics we add *Dendrobangia* (three species) and *Metteniusa* (three species).

CITRONELLA. [A somewhat inappropriate name, as 'little citron', in reference to the unrelated citron of the Rutaceae.] A genus of 25 species, from S America to Australia and sparsely west and north. On Kinabalu we find *Citronella suaveolens*, lower montane forest, 1500 m; *Citronella latifolia* was described from NW Sumatra and is found, rarely, in Java, N & E Borneo, Philippines (Catubig River in Samar), Sulawesi, Maluku, New Guinea. *Citronella philippinensis* is known from northern Luzon Island at about 1000 m.

GONOCARYUM. [Greek, angled-seed.] In *Flora Malesiana* the more than 35 basionyms were reduced and probably under described to about nine species from India east to S China, the Sundaic Region, including Borneo and northward throughout the Philippines (two species) to Taiwan. *Gonocaryum lobbianum* reaches northern Thailand and S China; there are five species in Malaya; none from Kinabalu seems unlikely.

These are small trees with a peculiar and entirely distinctive form. The upright axis bears spirally arranged leaves and scale leaves with irregular short and long internodes. The lateral branches are arrayed like the spokes of a wagon-wheel, and the shoot always ceases growth with a whorl of such branches. The apex of the upright shoot is a broad and bald dome, allowing easy recognition of the genus. The lateral branches bear leaves alternately; the blade is leathery and glabrous, the margin entire. The foliage is an attractive deep dark green. The flower sexu-



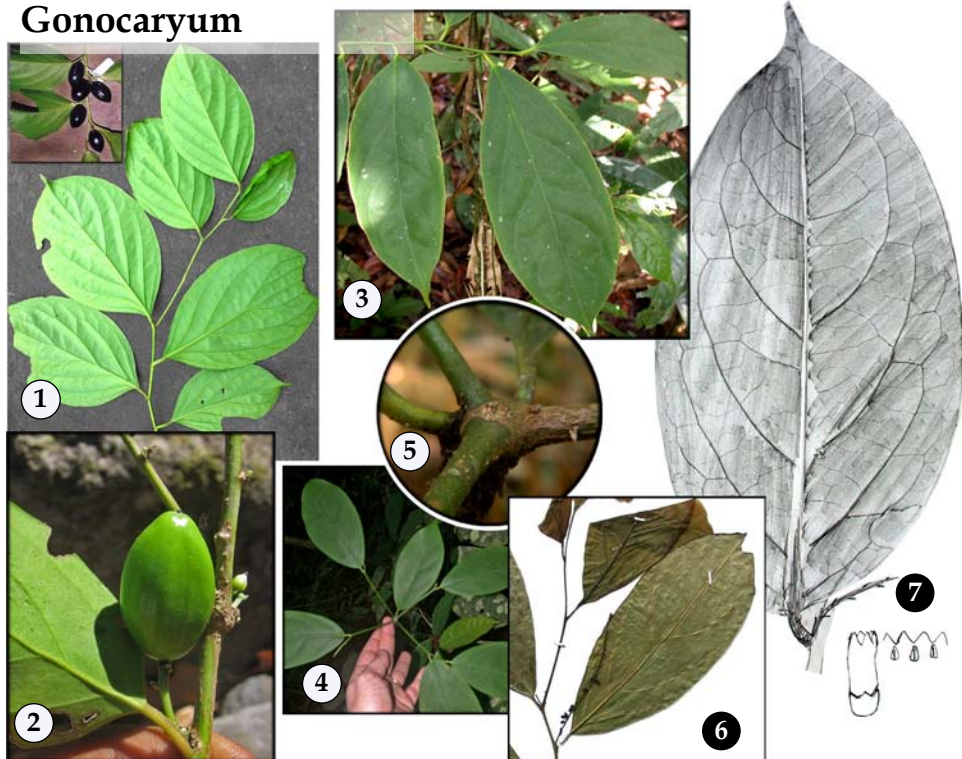
Citronella. 1, *C. latifolia*, Samar, Philippines, leaf 10 cm long; 2, *C. brassii*, New Guinea, leaf 17 cm long, showing the form of the inflorescence. (Original drawings from the type specimens.)

ality appears to vary among species some bisexual, some unisexual and dioecious. Most often the flowers in dense or interrupted axillary spikes. The corolla is tubular with five lobes, stamens number five, fused to the corolla tube alternate with the lobes. The mature fruit is an olive-like fleshy drupe, red or purple-black at maturity.

So little is known about these trees, that a few notes on the population biology may stimulate further research. The largest tree was a 28 cm DBH tree of *G. calleryanum* in Palanan, Philippines. The other species did not exceed 17 cm DBH. Growth rates were astonishingly slow. For *G. gracile* at Pasoh, Malaya, the majority of the many trees between 10 and 17 cm DBH grew not at all over 20 years, and none grew more than a total of 2 cm DBH. At Lambir, Sarawak, the two species were similarly slow growers. The population in Pasoh was widely scattered over the 50-ha plot, but at Lambir, *G. macrophylla* and *G. minus* were conspicuously separated within the plot in response to some combination of slope, soil and water.

¹Kårehed, J. 2001. American Journal of Botany 88: 2259–2274.

Gonocaryum



Gonocaryum. 1-2, *G. calleryanum*, Philippines; 1, leaf and twig, inset showing mature fruits; 2, immature fruit; 3-6, *G. gracile*, Pasoh, Malaya; 3, leaf and twig; 4, wagon-wheel twig arrangement; 5, broad and bald terminal bud of the orthotropic axis; 6, dried leaf with axillary inflorescence; 7, *G. macrophylla*, Lambir, line drawing of leaf venation and sketch of corolla tube and position of stamens. (Photographs 1 & 2 © Leonardo L. Co.)

#

ASTERIDS (CAMPANULIDS): AQUIFOLIALES

STEMONURACEAE

NAME: From the genus *Stemonurus*, as below.

OVERVIEW: The species that were clustered formerly under the old Icacinaceae are now scattered to three distinct clades in two different orders. Most of the tropical Asian trees of the old Icacinaceae are allied with the hollies in the Aquifoliales - *Gonocaryum* and *Citronella* in the previous family, while most of our genera are found here in the newly named family Stemonuraceae¹. These two families of the Aquifoliales are not just the Icacinaceae with a new name because the genera *Apodytes*, *Nothapodytes*, *Icacina* and *Platea* proved to have little in common with either of these clades except the absence

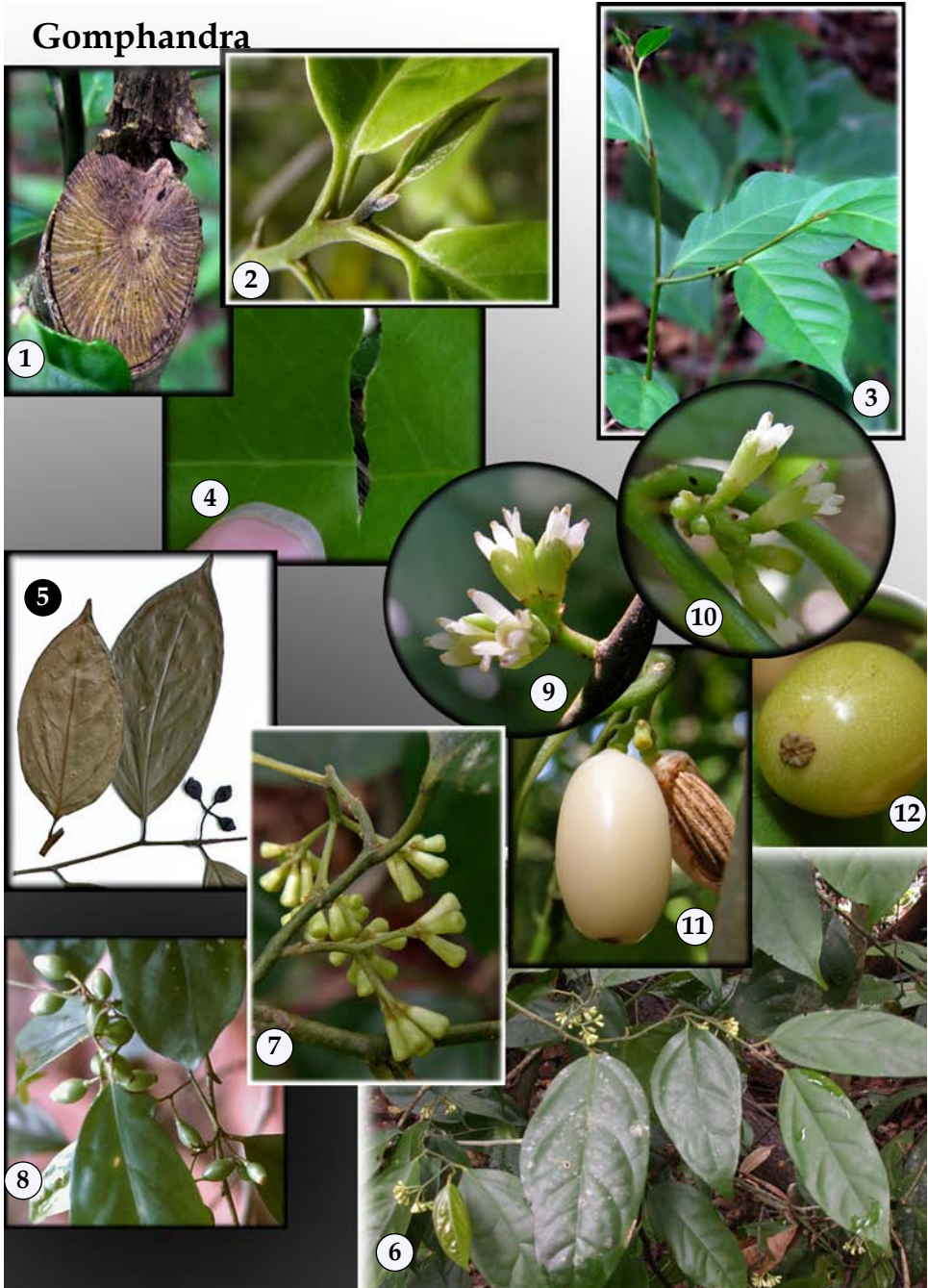
of many vegetative features and an ovary with two pendulous ovules. They are now in the narrowly circumscribed Icacinaceae and placed in the Garryales.

The family newly defined includes 12 genera and 95 species, and is predominantly of tropical Asia and the Pacific with sparse representation in Africa and only two species of *Discophora* in tropical America.

Most of our species are small evergreen and shade-loving trees of the forest understory native especially to the lowlands of the Sundaic Region with smaller representation throughout the rest of tropical Asia and with additional genera to the east from New Guinea to Australia and the Pacific. The leaves are simple, alternate, entire, and penninerved, without stipules. The leaf stalk is often sinuous with a groove on upper surface. The venation weakly lignified, often obscure especially when dry, while the blade texture and color are often distinct by genus. The flowers are either bisexual or unisexual (di-

¹Kärehed, J. 2001. American Journal of Botany 88: 2259-2274.

Gomphandra



Gomphandra. 1, cross-section of stem showing wide rays; 2, in the lateral shoots the leaves are distichous, the terminal bud naked, the node clean without swelling or stipules, the leaf stalk with a deep U-shaped channel; 3, in the upright shoot the leaves are spiral, lateral shoots strongly diverge from the plane of the stem and subtending leaf; 4, carefully torn leaf shows threads of protoxylem (cf. Celastraceae, *Aquilaria*, etc.); 5, typical dry leaves of herbarium specimen, upper and lower surface, the leaf stalk pinched where it joins the blade; 6, typical array of leaves in the understory with axillary clusters of in flowers; 7, the flower buds are typically flat-topped; 8, fruit remain green for months; 9, pistillate flower is broadened by the ovary within; 10, the staminate flower is narrow, note the thick filaments and stubby anthers that give the genus its name; 11, mature fruit are sometimes white, the seed within is strongly ribbed; 12, the blunt and persistent stigma is characteristic. (Photo 12, © Leonardo L. Co; photos 1-4, 9-11 © Melanie Schori, Ohio University, USA.)

oecious), articulated with the pedicel. The floral parts are most often in fives, the calyx small and lobed, petals small, white or green, stamens opposite the calyx lobes, typically hairy. The gynoecium is undistinguished except for the characteristic stigma which is most often sessile, broad and conspicuous in fruit. The fruit is a more or less flattened drupe, the stone of which is strongly ridged, sometimes the two sides differ in color and texture, as in *Medusanthera*, with a ribbed endocarp bearing one seed.

Four genera are illustrated, two other rare and poorly known genera are not illustrated. We could add two monotypic genera from east of our area: *Whimorea grandiflora* of Solomon Islands which differs from other *Stemonuraceae* in the linear filaments and anther cells, and in an ovary with an apical cavity into which the stigma is turned; *Hartleya inopinata* from New Guinea, as in *Medusanthera*, but flower parts are in fours, not fives.

GOMPHANDRA. [Greek, reference to the peg-shaped anthers.] Maybe 50 species, from India and Sri Lanka east to New Guinea, Solomon Islands, Australia, north throughout the Philippines.

These are small trees, the leaves alternate, the blade broad and thin. The most common and widespread species may be *Gomphandra quadrifida*, perhaps too broadly defined, recognized by the four to five arched nerves of the leaf, the lowermost of which crowd the base. The leaves are confusingly similar to those of *Strombosia* (Olacaceae) with which it often grows in the lowland forests of the Sundaic Region. The flowers of *Gomphan-*

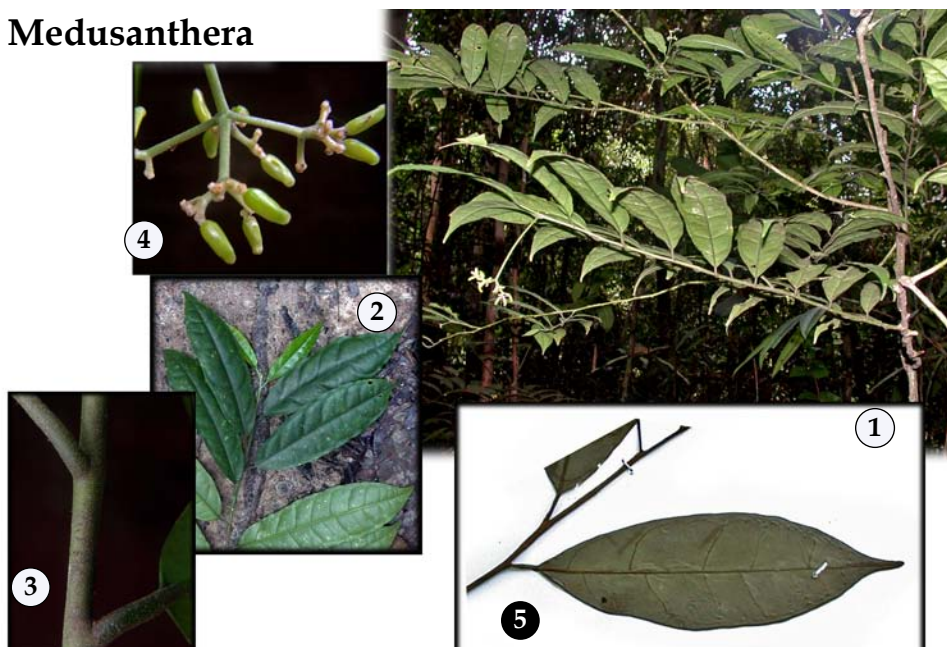
dra are similar to those in *Stemonurus* but the drupes are not laterally compressed and lack the fleshy appendage found in *Stemonurus*.

They are nowhere abundant and yet nearly every lowland wet forest in tropical Asia will have one or two species. It is hard to imagine a less conspicuous forest plant. It is certainly among the most easily overlooked of all trees of tropical Asia. Kinabalu alone records six different kinds, each recorded as "*Gomphandra* sp."

While every species of tree has a story to tell, *Gomphandra* has till now been silent with regard to every aspect of its life. Neither CORNER *loc. cit.* nor BURKILL *loc. cit.* offer the smallest comment. Nothing is known of the pollination of the small sprays of tiny flowers, nor of their dispersal which might reasonably be presumed effected by understory birds. These small trees rarely exceed 7 or 8 cm DBH, and grow hardly at all. Common names are rarely reported, while the contention that these widespread small understory plants have 'no economic use' suggests that there is something important still to be discovered. Ms. Melanie Schori at the University of Ohio is currently working on a much-needed revision of the species.

MEDUSANTHERA. [Greek, again in reference to the hairy filaments.] In the genus *Medusanthera* we find 15 basionyms which, for want of critical field study, are usually lumped into as few as four-five species. These are shrubs chiefly of the Pacific Islands with a few species westward as far as the Sundaic Region where *Medusanthera gracilis* is

Medusanthera



Medusanthera. 1-4, *M. gracilis*, Pasoh Forest Malaysia, small 2 cm DBH; 1, habit with pendent inflorescence; 2, leaves with nervation; 3, leaf base and node; 4, young fruit; 5, herbarium specimen showing the habit of dried leaf base and leaf texture.

fairly widespread at low density in lowland forests. The broadly conceived *Medusanthera laxiflora* has a wide distribution from the Pacific to New Guinea and widely in the Philippines. *Medusanthera* are small dioecious trees distinguished by the cup-shaped calyx and the ovary which is bilateral and matures as a flattened drupe with a fleshy body on the concave side. In the common *M. gracilis*, the leaves are extremely thin and papery when dry, the nerves clearly looped. The architecture of that species is curious among the small trees of the lowland forest, with spirally arranged branches that bear long sprays of alternately arranged leaves, at the end of which we sometimes find a small inflorescence.

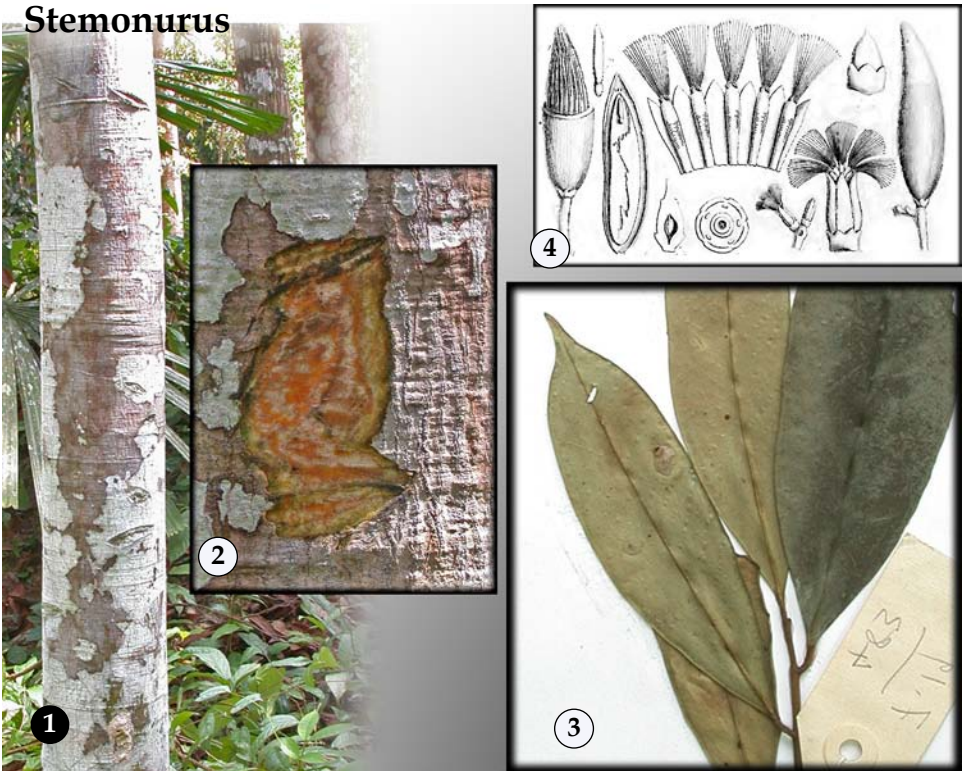
STEMONURUS. [Greek, a tail, reference to the tufted stamens.] Usually as 12 species, two in the Philippines, *S. gitingensis* and *S. umbellatus*.

These are trees of the lower canopy, rarely over 20 cm DBH, the trunk cylindrical with a straight upright mast bole; the wood is characteristic in the orange and white mottled inner bark.

The leaves are borne on a stiff straight leaf stalk, pinched toward the upper end. The blade usually bright green below, nerves and veins all but obscure and so possibly confused at first sight with trees such as *Maasia glauca* (Annonaceae) but lacking the peeling twig bark of that family. Evidently bisexual flowers, petals more or



Cantleya corniculata, bark of a 24 cm DBH tree, Lambir, Sarawak; leaf shape and venation drawing based on *Flora Malesiana* (volume 7, page 52); dry fruit and seed, public domain photograph by Steve Hurst from the USDA-NRCS PLANTS Database.



Stemonurus. 1-3, *S. malaccensis*; 1, even columnar trunk; 2, thin bark and wood mottled orange and white; 3, dry leaf, bicolor green and gold, lower surface even with obscure nerves; 4, *S. secundiflorus*, illustration of floral details, adapted from BLUME *loc. cit.*

less free with a keeled back and an inflexed apex. The stamens have flattened, fleshy filaments, wider above than below, with characteristic club-shaped hairs. The endocarp is fibrous. The importance of the inflorescence type is unclear; and can be described as umbellate or elongate scirpioid.

The maximum size of these trees seems to be 30-35 cm DBH. As with other members of the family, they are slow growing, rarely exceeding 1 mm DBH per year.

Malay names include *semburok* and *bedaru*. The timber is dense and is sometimes said to be valuable, but the amount is too scarce to create a market.

CANTLEYA. [Commemorates Nathaniel Cantley, d. 1888, Superintendent of Singapore Botanic Gardens, author of early report on forest conservation in Malaya.] Monotypic, *Cantleya corniculata*, chiefly in swamp forests, especially Borneo and Sumatra, and Johore. This species shares many characters with *Stemonurus*, but has

a sessile stigma and fusiform fruits. It attains the largest stature of any member of this family, sometimes exceeding 50 cm DBH. The standard trade name for the timber is the Indonesian *daru-daru*. The wood is heavy and hard with a light yellow-red color and smooth uniform texture. Reportedly, the fresh wood smells of sandalwood.

MERRILLIODENDRON. [Commemorates ED Merrill, American botanist of the Philippines.] *Merrilliodendron megacarpum*, western Pacific to New Guinea, Sulawesi and the Philippines. (Not illustrated.)

CODIOCARPUS. Two species, *Codiocarpus andamanicus* of the Andamans, and *C. merrittii* from Mindoro and Palawan. Said to be similar to *Medusanthera* in fruit, but differs in the glabrous filaments. (Not illustrated.)

#

ASTERIDS (CAMPANULIDS): AQUIFOLIALES

AQUIFOLIACEAE

NAME: From the old name of the holly, *Aquifolium* or *Argrifolium*, for the spiny leaves of the European species. Although *Ilex* is now the sole genus, the family name is conserved and the logical Ilicaceae is not an alternative.

OVERVIEW: A single genus *Ilex*, as below. These trees were formerly thought to be allied with the Theaceae, but the molecular evidence cited in the section on Aquifoliales gives strong support to the group that includes the hollies.

ILEX. [Classical name for *Quercus ilex*, mistakenly applied to the holly.] 405 species, more or less world-wide, especially tropical mountains, a few in Africa. The Malay *kerdam* is now standard but probably promulgated by the Forestry Department and better applied only to the lowland species, especially *kerdam paya* for *Ilex cymosa*. *Kerdam* does not appear in BURKILL *loc. cit.*, rather, he gives *mesirah* for the red-berried species, and *tetimab* for the lowland species. Flowers of three species are well illustrated in THROWER *loc. cit.*

Most of our species are small, evergreen, multi-branched shrubs with relatively thick leathery leaves, some, but not all, with toothed margins. Most are found above 800 m. Malaya claims 21 species, maybe 40 in

Borneo, and 15 or more in the Philippines. Malaysia has a fairly complete coverage^{1,2} although

new and locally common species are not a surprise. Elsewhere, the isolated mountain populations may be difficult to name.

Uplands, some vegetative convergence with other families: especially Theaceae and Symplocaceae. If in flower, they differ most obviously from those Ericalean families in the number of petals (usually four rather than five) and the stamens (usually four rather than many). Most of our species seem to be dioecious.

The few lowland species are another matter, and there is no sure clue to their identity. In fact, the lowland species are routinely mis-identified in herbaria to a wide variety of genera including: *Drypetes*, *Diospyros*, *Symplocos*, *Annonaceae*, *Chionanthus*, *Icacinaeae* and so on.

In the lowland equatorial forests, we find perhaps only three fairly common species of *Ilex*. *Ilex macrophylla* is never abundant and yet seems to show up at low densities just about everywhere in the Sundaic Region. Unlike other hollies, the leaf blade of *I. macrophylla* is thin and papery and dries a peculiar green with reddish nerves and a black leaf stalk. The other two lowland species, *I. cymosa* and *I. hypoglauca*, are prevalent in swamp forests. *Ilex cymosa* is also found in a variety of sites with poor soils, *kerangas*, gaps and secondary forest.

The hollies are such an obvious part of the mountain flora that we want to know from where do the lowland species come with regard to phylogeny and geography?

The tropical hollies are among the quietest of our plant families: they are not uncommon, and in some mountains can be conspicuous, but little to nothing is known of their physiology or reproduction, nor anything of their economic potential.

¹Kiew, R. 1978. Aquifoliaceae. Tree Flora of Malaya. 3: 1-32.

²Andrews, S. 2002. Aquifoliaceae. Tree Flora of Sabah and Sarawak. 4: 1-29.